

**REMARKS**

This is in response to the Office Action that was mailed on June 7, 2004. Clarificatory amendments are made to the specification. Claim 1 is amended to recite the products of the claimed process, based upon such disclosure as that appearing from page 48, line 6 to page 49, line 1 of the specification. New claim 23 is drawn to the species that was elected in the Paper filed on April 15, 2004. New claim 24 recites the co-catalyst of original claim 21, but depends from claim 23. No new matter is introduced. Claims 1-3, 14-21, 23, and 24 are in the application.

On page 6 of the Office Action, the Examiner alleged that the specification contains idiomatic inaccuracies. Applicants have reviewed the specification including the portions thereof cited by the Examiner. It is believed that of the portions of the specification cited by the Examiner only the top of page 35 needs correction, and that correction is made by this Amendment.

**Indefiniteness**

Claims 1 and 21 were rejected under the second paragraph of 35 U.S.C. §112 as failing to define the invention properly. The rejection is respectfully traversed.

The Examiner asserts that Applicants "cannot claim" various compounds. Applicants may and have claimed that which they regard as their invention. Also, it is noted that all of the present claims are drawn to synthetic processes, not to compounds.

The Examiner complains that "the product of the reaction is not recited in the claims". The Examiner is clearly incorrect in this assertion. The claims expressly recite that the product of the claimed process is "an organic compound which is an addition or substitution reaction product of a compound (A) and a compound (B) or an oxidized product thereof".

The invention of claim 1 herein is a process of reacting a compound (A) – which may be (A1), (A2), or (A3) – with a compound (B) – which may be (B1), (B2), or (B3) – in order to prepare products that are addition or substitution reaction products of compound (A) and compound (B) or oxidized products thereof. **Table R1** enclosed herewith shows examples of compound of categories (A) and (B), reaction types corresponding to various combinations thereof, and reaction products thereof.

Compounds (A) and (B). Compound (A) is a compound capable of forming a stable radical and serves as a radical donating compound in the reaction in question. Specification, page 36, lines 5-7. The compound (A) can be (A1) an oxygen-atom-containing compound having a carbon-hydrogen bond at a position adjacent to an oxygen atom, comprising at least one of (A1-1) to (A1-3). The compound (A) can alternatively be (A2) a carbonyl-group-containing compound or (A3) a compound having a hydrocarbon group with a methine carbon atom, comprising (A3-1) and/or (A3-2). Specification, page 36, lines 8-14 and page 41, lines 2-6. Typical examples of compound (A) are shown from line 15 on page 36 through line 5 on page 43 of the specification. Compound (B) is a radical scavenging compound. Compound (B) may be (B1) an unsaturated compound comprising at least one of (B1-1) to (B1-5), or (B2) compounds each having a hydrocarbon group with a methine carbon atom, similarly to compound (A3), or (B3) heteroatom-containing compounds comprising at least one of (B3-1) to (B3-4). Specification, page 43, lines 7-22 and page 45, lines 6-20. Typical examples of compound (B) are shown in the specification, from line 23 on page 43 through line 4 on page 46.

Reaction Type. In accordance with the process of this invention, an addition or substitution reaction product is formed corresponding to a combination of compound (A) and radical scavenging compound (B). Specification, page 48, lines 2-5. Such combinations include nine reaction types, as shown in the second row in **Table R1**. After completion of the reaction, reaction products can easily be separated and purified by conventional

techniques, such as filtration, concentration, distillation, extraction, crystallization, recrystallization, column chromatography, and other separation means, and combinations of these separation means. Specification, page 47, line 22 to page 48. line 1.

Reaction Products. In the third row of **Table R1**, all reaction products of claim 1 are grouped by compound (A). For example, when an oxygen-atom-containing compound (A1) having a carbon-hydrogen bond at a position adjacent to an oxygen atom is employed as compound (A), the position adjacent to the oxygen atom is bonded to an atom (e.g., a carbon atom) constituting an unsaturated bond of an unsaturated compound (B1), to the methine carbon atom of a compound (B2) having a hydrocarbon group with a methine carbon atoms, or to the heteroatom of a heteroatom-containing compound (B3). Thus, an addition or substitution reaction product is obtained. When a carbonyl-group containing compound (A2) is employed as compound (A), a bond between a carbonyl group and an atom adjacent to the carbonyl group is broken, and an atomic group containing the carbonyl group (e.g., an acyl group) is bonded to the aforementioned position of the compound (B1), (B2), or (B3) to yield an addition or substitution reaction product. When compound (A3) containing a hydrocarbon group with a methane carbon atom is employed as compound (A), the methine carbon atom is bonded to the aforementioned position of a compound (B1), (B2), or (B3) to yield an addition or substitution reaction product. Specification, page 48, line 6 to page 49, line 1.

The addition or substitution reaction product formed through the above reaction or the oxidized product formed through oxidation of the reaction product may further undergo, for example, a dehydration reaction, a cyclization reaction, a decarboxylation reaction, a rearrangement reaction, or isomerization, depending on the structure of the product, to yield a corresponding organic compound. Specification, page 50, lines 3-9.

Clearly, the claims herein particularly point out to those skilled in the art the subject matter which Applicants regard as their invention.

### Usefulness

Claims 1 and 21 were rejected under 35 U.S.C. §101 as allegedly being drawn to an invention that is not useful. The present invention provides of a class of imide catalysts that can be used in a class of reactions to produce classes of organic compounds. The utilities of the products provided by the present invention are described in the specification. Specifically, for instance, a hydroxy- $\gamma$ -butyrolactone derivative provided by a process of claim 3 is useful as, for example, a material for pharmaceuticals, agricultural chemicals, and other fine chemicals, photosensitive resins, and other functional polymers. Specification, page 1, lines 8-12 of the paragraph "Technical Field". The compound represented by the formulae (14) and (15) are useful as, for example, materials for pharmaceuticals, agricultural chemicals, and other fine chemicals, and materials for functional polymers. Specification, page 102, lines 5-8. The compounds represented by the formula (18) are useful as, for example, materials for pharmaceuticals, agricultural chemicals, and other fine chemicals, and materials for functional polymers. Specification, page 100, line 25 to page 100, line 2. The compounds represented by the formula (19) are useful as, for example, materials for pharmaceuticals, agricultural chemicals, and other fine chemicals, and materials for functional polymers. Specification, page 102, lines 11-13. The process of claim 1 provides well known compounds having well known utilities. Applicants respectfully submit that this invention meets the usefulness requirements of the statute.

### Written Description and Enablement

Claims 1 and 21 were rejected under the first paragraph of 35 U.S.C. §112 as being drawn to an invention that is not useful and as failing to comply with the written description requirement and as being broader than the enabling disclosure. The rejections are respectfully traversed.

Utility The present invention provides of a specified **class** of imide catalysts that can be used in a specified **class** of reactions to produce specified **classes** of organic compounds. Applicants respectfully submit that this invention meets the usefulness requirements of the statute.

Applicants enclose herewith for reference the following documents:

(D1) J. Org. Chem. 1996, 61, 4520-4526

(D2) U.S. Patent No. 5,958,821

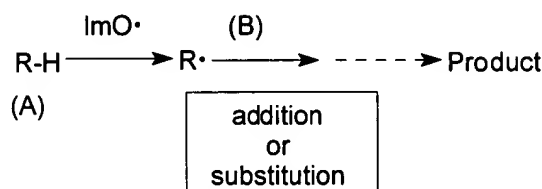
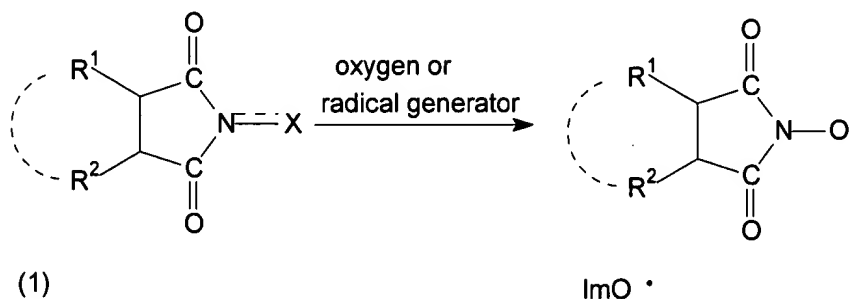
D1 is a publication by among others Yasutaka Ishii, one of the present inventors. D1 shows a reaction path for the oxidation using the imide compound in Scheme 1 on page 4522. In Scheme 1, the first step of the reaction involves the generation of the phthalimide N-oxyl radical 45 from N-hydroxyphthalimide (NHPI) and molecular oxygen. The resulting radical 45 removes a hydrogen atom from the substrates to form alkyl radicals, subsequent oxygenation of which by molecular oxygen produces peroxy radicals, which are then converted to ketones and/or dicarboxylic acids. See page 4524, right column, latter half of the first paragraph.

D2 discloses an oxidation catalytic system comprising an imide compound and a co-catalyst, which is useful for oxidation of a substrate with oxygen to produce a corresponding oxide with high efficiency. D2 also discloses oxidation (or a process for producing a ketone, an alcohol, an aldehyde, or a carboxylic acid) using the catalytic system.

Documents D1 and D2 provide evidence that the utility of the present invention is in an art-recognized field of utility.

The process of the present invention comprises a reaction which differs from the above oxidation reaction. However, the initiation mechanism of the present reaction involves formation of an N-oxy radical of an imide compound,

which is similar to the mechanism of the above oxidation reaction. More specifically, the reaction mechanism of the present invention is as follows.



The radical generator or oxygen acts upon the imide compound represented by the formula (1), and a free radical is formed on an oxygen atom bonded to a nitrogen atom of the imide compound. Specification, page 49, lines 16-19. This corresponds to the aforementioned reaction path in D1. The term “radical generator” for use in the present invention is employed in a wide range of meanings and includes any substances that are capable of forming a radical ( $>NO \cdot$ ) on an oxygen atom bonded to a nitrogen atom of the imide compound. Specification, page 35, lines 5-8.

As stated above, the free radical can be shown in the imide compound N-oxyl radical form of an imide compound ( $ImO \cdot$ ). This radical abstracts a hydrogen from compound (A), and a free radical is then generated on a carbon atom of the compound (A). This free radical attacks an atom constituting the compound (B) to yield a product of an addition or substitution reaction or an oxidized product thereof by a radical mechanism. Specification, page 49, line 19

to page 50, line 2.

In connection with the above reaction, the present inventors have already published in various scientific journals. Among such publications are:

- (D3) Chem. Commun., 2000, 613-614
- (D4) Chem. Commun., 2000, 2457-2458
- (D5) J. Org. Chem. 2001, 66, 6425-6431.

D3, D4, and D5 were published on March 28, 2000, December 11, 2000, and September 21, 2001, respectively. They disclose reaction paths that are reflective of the present invention. These publications provide evidence also that the present invention has met with acceptance in the scientific community.

Written Description. It is respectfully submitted that the written description requirement of the statute is satisfied by such disclosure as that appearing in the paragraph bridging pages 10-12 of the specification. Also, the Examiner's attention is respectfully directed to **Table R3**, which shows examples in the present specification. **Table R3** includes formulae of substrates and products in addition to compound identifiers, reaction types, and product groups, all with respect to claim 1. Clearly, the examples and generic text herein satisfy the written description requirements of the statute.

Enablement. Regarding the enablement rejection, the Examiner argues that "The claimed process is not believable on its face". The Examiner is respectfully requested to clarify that statement. It is respectfully submitted that the Examiner's analysis of the 8 *Wands* factors is flawed.

1. & 2. The Examiner alleges that "the claimed invention involves process [sic] of making any organic compound". Actually, the claimed invention involves a process for making an organic compound that is an addition or substitution reaction product of a compound (A) and a compound (B) or an oxidized product thereof.

3. The Examiner argues that "There is no known prior art claiming a process for making all organic compounds". Relevant background art is discussed on pages 2-6 of the specification. The Examiner's attention is also directed to the Information Disclosure Statement that was filed by Applicants on 11 August 2000, lost by the USPTO, and refiled by Applicants on 9 January 2003.

4. The Examiner indicates that

The level of ordinary skill in the art is high but only in process of process of [sic] making  $\alpha$ -hydroxy- $\gamma$ , $\gamma$ -dimethyl- $\gamma$ -butyrolactone.

Does this mean that the level of skill in the art is not high for the presently claimed processes of making  $\alpha$ -hydroxy- $\gamma$ -butyrolactone and  $\alpha$ -hydroxy- $\gamma$ -ethyl- $\gamma$ -propyl- $\gamma$ -butyrolactone? The Examiner is respectfully requested to explain what he means by his statement with respect to level of skill in the art.

5. & 6. The Examiner alleges that the level of "predictability is very low and ... the amount of direction and guidance provided by applicant is limited to assays involving process [sic] of making  $\alpha$ -hydroxy- $\gamma$ , $\gamma$ -dimethyl- $\gamma$ -butyrolactone". The Examiner fails to indicate how he decided that the level of predictability is "very low". The present claims define the two classes of reactants that are being reacted with one another functionally as well as with reference to their structural components, as follows:

(A) a compound capable of forming a stable radical and being selected from (A1) oxygen-atom-containing compounds each having a carbon-hydrogen bond at the adjacent position to an oxygen atom, (A2) carbonyl-group-containing compounds, and (A3) compounds each having a hydrocarbon group with a methine carbon atom

and

(B) a radical scavenging compound selected from (B1) unsaturated compounds, (B2) compounds each having a hydrocarbon group with a methine carbon atom, and (B3) heteroatom-containing compounds.



Accordingly, a high degree of predictability is inherent in the present invention. As for direction and guidance, attention is directed to pages 24-107 of the specification, which provide extensive and detailed direction and guidance as to how to practice the presently claimed invention. The Examiner is requested to explain his remark about limitation “to assays involving process [sic] of making  $\alpha$ -hydroxy- $\gamma$ , $\gamma$ -dimethyl- $\gamma$ -butyrolactone”.

7. The Examiner does not address *Wands* factor 7, the existence of working examples. The present specification includes 38 fully documented working Examples illustrating the practice of a wide variety of embodiments of the present invention.

8. The Examiner's point on experimentation is not understood. Not any experimentation, only “undue” experimentation, is forbidden by the statute. The Examiner has the burden of establishing – not simply arguing – that undue experimentation would be necessary. In any case, the present invention does not lend itself to “undue experimentation” problems. To establish coverage under claims 1 and 21, one simply allows a compound capable of forming a stable radical as defined in (A1)-(A3) to react with a radical scavenging compound as defined in (B1)-(B3) – in the presence of an imide compound of Formula (1) and, for claim 21, in the presence of a metallic co-catalyst – and then one determines whether an addition or substitution reaction product has formed. Where is the **undue** experimentation?

Applicants respectfully contend that all of the claims presented in this application are fully enabled by the disclosure.

#### Restriction and withdrawal of claims from consideration

In the outstanding Office Action, the Examiner purports to make a restriction requirement “final”. However, Applicants believe that the Office

Action of March 15, 2004 constituted a requirement for election of species rather than a restriction requirement. Requirements for restriction generally identify mutually exclusive groups of claims that correspond to different invention "groups". Clarification is respectfully requested.

In the outstanding Office Action, the Examiner indicated that claims 2, 3, and 14-20 are withdrawn from consideration. The presently claimed synthetic process involves the reaction of two classes of compounds, designated in claim 1 as (A) and (B). Claim 2 reacts a species of (A) designated as (A11) and a species of (B) designated as (B11). Claim 3 reacts a species of (A) designated as (A11) and a species of (B) designated as (B12). Claim 14 reacts a species of (A) designated as (A12) and a species of (B) designated as (B13). Claim 15 reacts a species of (A) designated as (A13) and a species of (B) designated as (B11). Claim 16 reacts a species of (A) designated as (A31) and a species of (B) designated as (B11). Claim 17 reacts a species of (A) designated as (A31) and a species of (B) designated as (B14). Claim 18 reacts a species of (A) designated as (A31) and a species of (B) designated as (B15). Claim 19 reacts a species of (A) designated as (A11) and a species of (B) designated as (B21). Claim 20 reacts a species of (A) designated as (A32) and a species of (B) designated as (B22). At least claims 1, 3, 21, 23, and 24 read on the elected species of invention. There is therefore no basis for the withdrawal from consideration of those claims.

In more detail, in accordance with this invention, a variety of organic compound as shown below can be obtained by allowing an appropriate combination of a compound (A) capable of forming a stable radical with a radical scavenging compound (B) to react with such compound (B). Specification, page 51, lines 6-10. All of these reactions share a common reaction mechanism, and therefore all of present claims 1-3, 14-21, 23, and 24 form a single general inventive concept.

Details of claims other than claim 1 are described in the pages that follow.

(i) Reactions (refer to **Table R1**)

Each reaction of claims 2, 3, and 14 to 20 in **Table R1** can be matched off against reactions included in claim 1 by applying compound numbers of substrates, reaction type, and product groups of claim 1 to the other claims.

CLAIM 2. The invention of claim 2 is a process according to claim I, wherein the alcohol of the formula (2) [A11] is allowed to react with the active olefin of the formula (3) [B11] in the presence of molecular oxygen by catalysis of the imide compound of the formula (1) to yield the 1,3-dihydroxy compound of the formula (4). Typical examples of the compounds represented by the formulae (2), (3) and (4) are described in the specification on page 51, line 19 to page 6, line 9. The reaction comprises the substrates (A1) and (B1), so it corresponds to Type 1.

CLAIM 3. The invention of claim 3 is a process according to claim I, wherein the alcohol of the formula (2) [A11] is allowed to react with the  $\alpha$ ,  $\beta$ -unsaturated carboxylic acid derivative of the formula (5) [B12] in the presence of molecular oxygen by catalysis of the imide compound of the formula (1) to yield the  $\alpha$ -hydroxy- $\gamma$ -butyrolactone derivative of the formula (6). Typical examples of the compounds represented by the formulae (2), (5) and (6) are described in the specification on page 65, line 5 to page 67, line 4. The reaction comprises the substrates (A1) and (B1), so it corresponds to Type 1.

CLAIM 14. The invention of claim 14 is a process according to claim 1, wherein the alcohol of the formula (2a) [A12] is allowed to react with the active olefin of the formula (3a) [B13] in the presence of molecular oxygen by catalysis of the imide compound of the formula (1) to yield the conjugated unsaturated compound of the formula (11). Typical examples of the compounds represented by the formulae (2a) and (3a) are described in the specification on page 92, line 22 to page 94, line 4. The reaction comprises the substrates (A1) and (B1), so

it corresponds to Type 1.

CLAIM 15. The acetal of the formula (12) [A13] is allowed to react with the active olefin of the formula (3) [B11] in the presence of molecular oxygen by catalysis of the imide compound of the formula (1) to yield the  $\beta$ -hydroxyacetal compound of the formula (13). Typical examples of the compound represented by the formula (12) are described in the specification on page 95, line 9 to page 96, line 13. The reaction comprises the substrates (A1) and (B1), so it corresponds to Type I.

CLAIM 16. The compound of the formula (14) [A31] having a methine carbon atom is allowed to react with the active olefin of the formula (3) [BII] in the presence of molecular oxygen by catalysis of the imide compound of the formula (1) to yield at least one hydroxy compound selected from the formulae (15) and (16). Typical examples of the compounds represented by the formulae (14) and (15) are described in the specification on page 97, line 9 to page 98, line 20 and page 99, lines 11-22, respectively. The reaction comprises the substrates (A3) and (B1), so it corresponds to Type 2.

CLAIM 17. The compound of the formula (14) [A31] having a methine carbon atom is allowed to react with the active olefin of the formula (3b) [B14] in the presence of molecular oxygen by catalysis of the imide compound of the formula (1) to yield the carbonyl compound of the formula (17). This process corresponds to a case in which a compound having a hydrogen atom as  $R^e$  is employed as the active olefin of the formula (3) in the production of the hydroxy compound. In this case, the carbonyl compound of the formula (17) is formed instead of, or in addition to, a compound corresponding to the formula (15) ( $R^e = H$ ) and/or a compound corresponding to the formula (16) ( $R^e = H$ ). The proportion of both compounds formed can be controlled by appropriately selecting reaction conditions such as reaction temperature, amount of the catalyst, and the type of the co-catalyst (metallic compound). Specification, page 100, lines 3-13. Typical examples of the compound represented by the formula (17) are described in the specification on page 100, lines 17-25. The

reaction comprises the substrates (A3) and (B1), so it corresponds to Type 2.

CLAIM 18. According to the present process for producing a compound having an electron attracting group, A compound of the formula (14) [A13] having a methine carbon atom is allowed to react with AN active olefin of the formula (3c) [B15] in the presence of molecular oxygen by catalysis of the imide compound of the formula (1) to yield the organic compound of the formula (18). This process corresponds to a case in which a compound having hydrogen atoms as  $R^c$  and  $R^d$  is employed as the active olefin of the formula (3) in the production of the hydroxy compound. In this process, the compound of the formula (18) is formed instead of, or in addition to a compound corresponding to the formula (15) ( $R^c = R^d = H$ ), a compound corresponding to the formula (16) ( $R^c = R^d = H$ ) or a compound corresponding to the formula (17) (only in the case where  $R^c = R^d = H$ , and  $R^e = H$ ). Specification, page 101, lines 11-23. Typical examples of the compound represented by the formula (18) are described in the specification on page 102, lines 4-11. The reaction comprises the substrates (A3) and (B1), so it corresponds to Type 2.

CLAIM 19. The alcohol of the formula (19) can be produced by allowing the alcohol of the formula (2) [All] to react with the compound of the formula (14) [B21] having a methine carbon atom in the presence of molecular oxygen by catalysis of the imide compound of the formula (1). Typical examples of the compounds represented by the formulae (2) and (14) are described in the specification on page 102, line 21 to page 103, line 1. The reaction comprises the substrates (A1) and (B2), so it corresponds to Type 3.

CLAIM 20. The coupling product (a hydrocarbon) of the formula (20) can be obtained by allowing the compound of the formula (14a) [A32] having a methine carbon atom to react with the compound of the formula (14b) [B22] having a methine carbon atom in the presence of molecular oxygen by catalysis of the imide compound of the formula (1). Typical examples of the compounds represented by the formulae (14a) and (14b) are described in the specification on page 103, line 20 to page 104, line 9. The reaction comprises the substrates

(A3) and (B2), so it corresponds to Type 4.

It is manifest from the above description that the process of the present invention can efficiently produce a variety of organic compounds by an addition or substitution reaction conducted under mild conditions.

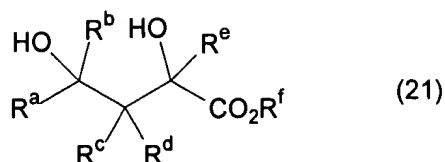
(ii) Reaction Path (refer to **Table R2**)

CLAIMS 2 AND 3. A reaction between the alcohol of the formula (2) and the active olefin of the formula (3) can be performed in accordance with the procedure described in the reaction between the compound (A) and the compound (B).

In this reaction, a 1,3-dihydroxy compound of the formula (4) is believed to be formed in the following manner. A 1-hydroxyalkyl radical which is formed in a system and corresponds to the alcohol of the formula (2) attacks and is added to a carbon atom at the  $\beta$ -position of the group Y of the two carbon atoms constituting an unsaturated bond of the active olefin of the formula (3), and oxygen attacks a radical at the  $\alpha$ -position formed through addition to yield a 1,3-dihydroxy compound of the formula (4). See claim 2 and specification, page 63, lines 16-24.

In the compound of the formula (4) formed through this reaction, when Y is an alkoxycarbonyl group, aryl oxycarbonyl group, or another ester group, or a carboxyl group, a cyclization reaction may further proceed to yield a furanone derivative ( $\alpha$ -hydroxy- $\gamma$ -butyrolactone derivative) of the formula (6). See claim 3 and specification, page 63, line 25 to page 64, line 4.

According to the invented process of claim 3, an  $\alpha,\gamma$ -dihydroxycarboxylic acid derivative, an embodiment of the compounds of formula (4), shown by the following formula (21), is formed as a reaction intermediate:



wherein  $R^a$ ,  $R^b$ ,  $R^c$ ,  $R^d$ ,  $R^e$ , and  $R^f$  have the same meanings as defined above. This compound is believed to be formed in the following manner. A 1-hydroxyalkyl radical which is formed in the system and corresponds to the alcohol of the formula (2) attacks and is added to the  $\beta$ -position of the  $\alpha,\beta$ -unsaturated carboxylic acid derivative of the formula (5), and oxygen attacks a radical at the  $\alpha$ -position formed through addition to yield the compound in question. The formed  $\alpha,\gamma$ -dihydroxycarboxylic acid derivative of the formula (21) undergoes cyclization under reaction conditions to yield the target  $\alpha$ -hydroxy- $\gamma$ -butyrolactone derivative of the formula (6). Specification, page 68, lines 5-23.

CLAIM 14. The conjugated unsaturated compound of the formula (11) is believed to be formed in the following manner. Initially, a dihydroxy compound corresponding to the formula (4) [a compound where  $R^a = R^iR^jCH$  group, and  $R^b = R^c = H$  in the formula (4)] is formed, and two molecules of water are then eliminated from this compound. Reaction products can be separated and purified in the same separation means as above. Specification, page 94, line 22 to page 95, line 2.

CLAIM 15. In the reaction of claim 15, the  $\beta$ -hydroxyacetal compound of the formula (13) is believed to be formed in the following manner. Initially, a 1,1-di-substituted oxyalkyl radical corresponding to the acetal of the formula (12) is formed, and this radical attacks and is added to a carbon atom at the  $\beta$ -position of the group Y between the two carbon atoms constituting an unsaturated bond of the active olefin of the formula (3), and oxygen attacks a radical at the  $\alpha$ -position formed through addition. Specification, page 96, line 20 to page 97, line 2.

CLAIM 16. In this reaction, the hydroxy compound of the formula (15) or the hydroxy compound of the formula (16) is believed to be formed in the

following manner. A radical is formed at the methine carbon position of the compound of the formula (14), and the radical attacks and is added to a carbon atom at the  $\alpha$ -position or a carbon atom at the  $\beta$ -position of the group Y between the two carbon atoms constituting an unsaturated bond of the active olefin of the formula (3), and oxygen attacks a radical at the  $\alpha$ -position or  $\beta$ -position formed through addition to yield the hydroxy compound of the formula (15) or the hydroxy compound of the formula (16). Specification, page 98, line 26 to page 99, line 10.

CLAIM 17. The carbonyl compound of the formula (17) is believed to be formed by the oxidation of the compound corresponding to the formula (15) ( $R^c = H$ ) in a system. Specification, page 100, lines 14-16.

CLAIM 18. The compound of the formula (18) is believed to be formed in the following manner. The methylol group of a compound corresponding to the formula (16) ( $R^c = R^d = H$ ) is further oxidized in the system to yield a carboxyl group, and the carboxyl group undergoes decarboxylation to yield the compound of the formula (18). Specification, page 101, line 24 to page 102, line 3.

CLAIM 19. According to the reaction, the alcohol of the formula (19) is believed to be formed in the following manner. A 1-hydroxyalkyl radical formed in a system and corresponding to the alcohol of the formula (2) attacks the methine carbon atom of the compound of the formula (14) to yield the alcohol of the formula (19). Specification, page 103, lines 6-11.

CLAIM 20. In this reaction, the coupling product of the formula (20) is believed to be formed in the following manner. A radical is formed at the methine carbon position of the compound of the formula (14a), and this radical attacks the methine carbon atom of the compound of the formula (14b) to yield the coupling product of the formula (20). Specification, page 104, lines 14-19).

As demonstrated above, the specification herein enables any person skilled in the art to understand and practice the invention, without undue experimentation, in a scope commensurate with the present claims.



It can be seen from the above evidence and discussion that the rejection of claims 1 and 21 under the first paragraph of 35 U.S.C. §112 – as being drawn to an invention that is not useful and as failing to comply with the written description requirement and as being broader than the enabling disclosure – is not sustainable.

### **Conclusion**

The Examiner is respectfully requested to withdraw all of the rejections of record and to pass this application to issue with claims 1-3, 14-21, 23, and 24.

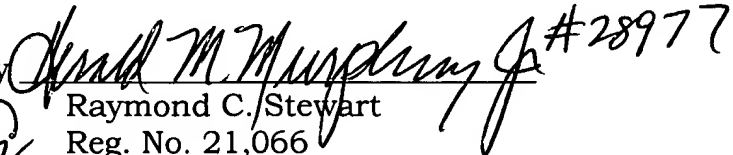
If the Examiner has any questions concerning this application, he may contact Richard Gallagher, Reg. No. 28,781, at (703) 205-8008.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant(s) respectfully petition(s) for a one (1) month extension of time for filing a reply in connection with the present application, and the required fee of \$110.00 is attached hereto.

If necessary, the Commissioner is hereby authorized to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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